# Photographic Manipulation.

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THE

# WAXED PAPER PROCESS

OF

## GUSTAVE LE GRAY.


TRANSLATED FROM THE FRENCH.

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LONDON:
PUBLISHED BY GEORGE KNIGHT AND SONS,
FOSTER LANE CHEAPSIDE.
M.DCCC.LIII.

THE following translation of the admirable process of M. GUSTAVE LE GRAY it is hoped, will not be unacceptable to the lovers of the Photographic art. In order to render it as concise as possible, the translator has left out several paragraphs, which, though in the original, he considered unnecessary. He trusts, however, that nothing of importance to the carrying out of the processes with entire success has been omitted by him.

In respect to the weights and measures. The ounce is the advoirdupois of 480 grains, and the pint the imperial of twenty ounces.

# PREFACE.

AMONGST the discoveries of the present day, Photography may be considered as the one likely to render the greatest service to art.

Its influence upon painting must be considerable, for at the same time that it removes many difficulties with which the artist has to contend, it raises the public taste by accustoming them to view nature in all her fidelity, frequently accompanied with exquisite taste and sentiment.

Since its first discovery, Photography has made rapid progress, especially as regards the instruments employed in its practice, it now remains for the artist to raise it to its proper position among the fine arts.

It is my belief that the future success of Photography rests entirely on the paper process; and I cannot, therefore, too strongly recommend the amateur to direct his attention to this branch of the art. He will obtain upon paper as much finish and more artistic effect than upon glass. The pictures upon the latter are certainly very fine but artistically hard, and give often a false appearance as regards the tones of the lights and shadows, not affording an impression true to nature. Pictures upon glass by the aid of Collodion, offer certainly some advantages in the rapidity of the action and exquisite finish; this is of great importance in portraiture, but its

fragility made me abandon it after the discoveries I made in 1849.

The success of my process rests entirely on the fabrication of the paper. By the carrying out the method of preparation which I have laid down in the following pages, a good picture cannot fail to be the result. I think every one will agree with me that the paper process is far more agreeable, more convenient for travelling, lighter to carry, and not fragile like glass. I think, therefore, that the results hitherto obtained by the glass process cannot for one instant counterbalance the advantages possessed by the paper.

GUSTAVE LE GRAY.

# PHOTOGRAPHIC MANIPULATION.

## PRELIMINARY PREPARATION OF THE NEGATIVE PAPER, OR WAXING PROCESS.

1. The object obtained by this process, is the filling up completely all the pores of the paper, by the introduction of wax.

The paper when thus prepared assumes the appearance and strength of parchment; and after the development of the image, it does not require to be again waxed to obtain a positive picture.

2. Take a large daguerreotype plate, or similar piece of plated metal, and place it horizontally on a stand. Warm it by passing a spirit lamp under it, or it may be heated more equally by a water bath; pass then over its surface a piece of white wax; when a good layer of melted wax has thus been obtained, place a sheet of paper on it, and facilitate the adhesion by means of a card. When the paper appears completely saturated, remove and place it between sheets of bibulous or blotting paper, over which pass a moderately hot iron, in order to absorb any excess of wax; as it is essential that the wax should be equally spread through the body of the paper, and that none should remain on the surface. A sheet of well prepared paper, when held up to the light, should not show any shining spots or patches on its surface, but be

uniformly transparent. Care should be taken that the iron is not too hot. Thin paper is preferable for this process.

3. We may here mention some of the advantages of the waxed paper process. From the great transparency of the paper, we are able, when applying the sensitive solution, to perceive any air-bubbles that might rest on its under surface; and in the developing process, the negative may be allowed to remain a very long time in the gallic acid without fear of injury. I have occasionally left pictures three days in the gallic acid without any detriment to them; but the greatest advantage which this process possesses, is that the sensitive paper can be used dry, and kept several days without injury to its sensitiveness. By this process the dark parts or shadows in the picture are well defined, even when thin paper is employed, which it is impossible to obtain by any other method.

4. When the paper is immersed in the bath of iodide of potassium, the solution penetrates completely into the wax and takes from it the greasy appearance, and allows the various preparations that follow to flow evenly. The paper should remain from half an hour to an hour in the iodide solution, according to the thickness of the paper, in order that the wax may be perfectly saturated. On removing the paper from the iodide solution and drying it, it assumes a violet tint, the result of some combination of the iodine with the wax; and this is so far convenient, for the time for immersing the iodized paper in the aceto-nitrate is just so long as to remove this violet tint.

## FIRST OPERATION.

### PREPARATION OF THE NEGATIVE PAPER.

5. Boil 7 oz. of rice with 320 grains of isinglass in 6 pints of distilled water, in a porcelain or glass vessel; the grains of

rice should only be slightly broken, so that the liquid obtained is not rendered sticky by an excess of starch, but contains only the glutinous portion of the rice; the whole is then to be strained through a piece of fine linen.

6. To prepare the first bath, in which the waxed paper is to be immersed, dissolve in 2 pints of the rice water the following—

| | | |
|---|---|---|
| 1½ | ounces | Sugar of milk. |
| ½ | „ | Iodide Potassium. |
| 12 | grains | Cyanuret do. |
| 7½ | „ | Fluoride do. |

When all are dissolved, filter the solution through fine linen, and preserve the clear liquid in a bottle for use.

This preparation will keep perfectly good for a long time, and may be used to the last drop; in cold weather, it is better to slightly warm the solution before using it. To prepare the paper, pour into one of the photographic dishes a quantity of the solution, to the depth of one inch or more; plunge into this sheet after sheet of the waxed paper, taking care to remove all air-bubbles that may form; fifteen to twenty sheets may be thus immersed, and they may be left in from half an hour to an hour, according to the thickness of the paper employed. Now turn the whole mass; and commencing with the first sheet that was put in, take them out one by one, suspending them to a line by means of a bent pin attached to one of the corners, and allow them to dry. A roll of blotting paper applied to the angle where the drops fall, will facilitate the drying.

7. English and French papers should not be prepared in the same solution.

The paper being dry, is to be cut to the size required, and kept in a portfolio for use.

8. The paper thus prepared, should have a slight tint of violet, this tint is very easily obtained with an old solution

as such solution possesses an acidity which sets the iodine free.

The same result is to be obtained with a solution freshly prepared, by adding to it a small portion of pure iodine, three to four grains to the quart.

9. This paper being nearly insensible to light, it can be prepared in the day; however, too long an exposure to a strong light, will decompose the iodide of potassium, and precipitate the iodine upon the starch of the paper; it is, therefore, much better not to expose it to a strong light.

10. This paper will serve either for landscape or portraits, it gives good modulations of tone and intense blacks.

11. The liquid which remains after having taken out the paper, should be corked up in a bottle; it may be used to the last drop, but should be filtered previously.

12. There may be added with advantage to this solution, two whites of eggs beaten up to each quart.

## SECOND OPERATION.

### METHOD OF RENDERING THE IODISED WAXED PAPER SENSITIVE, AND FIT FOR USE IN THE CAMERA.

13. Prepare in the dark, or by the light of a single candle, the following solution in a bottle, with a ground stopper.

| | |
|---|---|
| Distilled water | 10 ounces. |
| Nitrate silver | 320 grains. |
| Acetic acid | $\frac{3}{4}$ ounces. |
| Animal charcoal | $\frac{1}{4}$ „ |

When the nitrate of silver is dissolved, add the acetic acid, after which the animal charcoal.

The bottle is to be well shaken, and the solution then left to settle; the clear liquid may in about half an hour be poured off and filtered, when it is ready for use.

14. The animal charcoal remaining in the bottle is to be

preserved, to decolorize the aceto-nitrate, should it become discoloured by the iodized paper in a subsequent operation. Care must be taken that all crystals formed at the bottom of the bottle be re-dissolved.

15. The above quantity of solution is calculated to render sensitive twenty sheets of paper, 10 in. by 14 in.; if a larger number be used, the sensitiveness will be lessened.

16. Two flat porcelain dishes are now to be perfectly cleaned;* into one is put a sufficient quantity of the aceto-nitrate of silver to cover the bottom to the depth of four-tenths of an inch, into the other distilled water. Upon the first dish, viz. the aceto-nitrate, is placed a sheet of the iodized waxed paper; the upper surface of the paper being pressed (by means of a suitable brush) so as to bring it into contact with the liquid, removing all air bubbles that may form on the under side. It is left in this bath four to five minutes; should the iodized paper be tinged with violet, it may be removed as soon as it changes to white, as it will then have received its maximum of sensibility.

17. The paper being removed from the nitrate of silver, is placed in the second dish, viz., that containing the distilled water; care being taken taken to remove all air-bubbles with another brush, which must be kept distinct.

Ten sheets may be prepared in the nitrate of silver dish, without refiltering the solution, and may be placed one over the other in the distilled water. The sheets are then to be removed by means of the brush or brushes, into a second basin, and fresh distilled water poured upon them; should the paper have to be kept for any length of time, it should receive an extra washing.

18. It is desirable to preserve these separate waters for uses we shall presently explain. (§ 33.)

Take out the paper sheet by sheet, dry it between some perfectly clean thick blotting paper, afterwards preserve it in another case of blotting paper ready for use.

* For this purpose the Papier Joseph will be found very convenient.

19. Some operators imagine that the sensitiveness of the paper is destroyed by washing it in the way recommended but this is not the case; the sensibility being given by the iodide of silver which is formed in the paper, and is insoluble in water.

20. These washings only remove the aceto-nitrate of silver, which by its causticity destroys the paper, and blackens it even in the dark.

Any one may convince himself of this by observing the paper filters which have served for the aceto-nitrate of silver, and which become black after some days, even in the dark chamber where light never enters.

21. This paper should not be dried by suspending it, being liable to spoil by so doing when in the gallic acid ; it is better placed between blotting paper, putting alternately a sheet of prepared and a sheet of blotting paper.

22. By keeping the paper from the light, it will preserve its sensitiveness for a fortnight.

23. This process will be found very convenient, for the tourist; since it dispenses with the manipulations, so inconvenient to practise away from home; it being sufficient to carry some frames furnished with sheets of prepared paper, and a portfolio well closed, which should contain, in addition to the sensitive paper, compartments in which to put it after exposure; on returning home in the evening or following morning the pictures should be developed.

24. The paper prepared by the waxed process is quite as sensitive as by the wet one, but the pictures require a longer time to develop in the gallic acid.

25. However short a period the paper may have been exposed to the light still an image will have been formed, and it will only require a sufficient time, in the gallic acid, to develop the image.

I am of opinion that the image is formed the moment the rays of light reflected from the object strike the sensitive

paper. All amateurs should direct their attention to this particular point, and seek to discover an agent to develop the latent image with increased power.

Thus, to give an example; I took two pictures of the same view, exposing the paper in the first instance twenty seconds, and in the second fifteen minutes; the result was the same, but the first, in order to be fully developed required, to be twenty-four hours in the gallic acid; whilst the second was fully brought out in an hour.

26. Since I have adopted this dry process I have scarcely ever failed in a picture, so I can with confidence recommend it. Amateurs may find at first a little difficulty in the manipulation, from its being totally different from the processes in general use; but with a little perseverance they will soon be convinced of its superior advantages.

27. The dirty and smeary appearance which the waxed paper frequently assumes in the gallic acid, and even after the picture has been dried, is of no consequence, as this completely disappears, and the picture becomes perfectly transparent after the wax has been re-melted, by exposing the negative to a sufficient degree of heat; this process should always be adopted, being superior to re-waxing. (§ 46.)

28. Ten sheets being finished, return the aceto-nitrate of silver into the bottle, containing the animal charcoal, agitate all together, and leave it an instant to settle; then re-filter it, and prepare a further ten sheets (more or less) as may be wanted.

When the aceto-nitrate of silver has served to prepare the proper quantity of paper, and is consequently exhausted, the remainder may be made useful, by pouring into it some chloride of sodium. A precipitate of chloride of silver is obtained, which serves, as I shall explain, to improve the hyposulphite of soda, enabling it to give finer tones to the pictures.

## THIRD OPERATION.

### EXPOSING THE SENSITIVE PAPER IN THE CAMERA.

29. Place the paper very smoothly in the dark slide, if a double one, with a piece of bibulous paper between the two, obtain a good and perfect image on the ground glass, focussing upon a middle object, one neither too near nor too distant. As to the time of exposure, experience only can determine it, though much of the beauty of the picture depends upon it.

30. For a portrait and using a compound lens, I find thirty seconds to one minute in the shade generally sufficient, and from ten to thirty seconds in the sun. For views and with a single lens and a diaphragm of $\frac{1}{2}$ in to $\frac{1}{8}$ diameter, from thirty seconds to twenty minutes in the sun, though much of course depends upon the object.

31. Heat, which is one great cause of acceleration, when operating by the wet process, has very little influence in this dry one. Thus by warming the slate upon which the prepared wet paper is placed, you operate much quicker, but the lens must be warmed also; if not, it will be covered with vapour, which will prevent the formation of the image. When operating in the sun this vapour will often form; in this case the lens must also be warmed, taking care to wipe it if necessary. This inconvenience is sometimes obviated by placing a white handkerchief over the camera, when the sun strikes too forcibly on it; the rays will thus be reflected and not heat the camera.

32. The exposure in the camera being finished, the image is but slightly apparent, and is only developed by the following operation, which can be done at once or left for one or two days or even longer.

I have often developed the picture ten days or a fortnight after the exposure in the camera, and have obtained a very good result.

## FOURTH OPERATION.

### DEVELOPING THE IMAGE.

33. The solution of gallic acid will not keep, it must there fore only be made when required.

Weigh up several packets of gallic acid of 7½ grains; put into a flat dish from half a pint to a pint of the water used for washing the negative, (§ 18) and which consequently contains a small quantity of aceto-nitrate of silver, put one or two of the packets of gallic acid into it, stir the whole together, and then plunge the negative picture in, so that both sides be well covered.

34. The development of the picture is readily seen even through the thickness of the paper, it may be left from ten minutes to one or two hours, and sometimes even longer, until it is fully developed. It is then to be taken out quickly, and put into another dish to wash it, rubbing it lightly on the back with the finger or brush, to remove the crystalline deposit, which might spoil it. The grey tint which the waxed picture takes, whilst remaining in the gallid acid, is of no consequence as it totally disappears afterwards, and the lights and shades are beautifully developed.

35. The tone which the negative takes in the gallic acid will enable the operator to judge whether the time of exposure in the camera was sufficient. If it becomes immediately dark grey all over, (examined of course by being held up to the light,) it has been exposed too long in the camera.

36. If the strong lights, which should be the deep blacks, of the negative, are not darker than the half tints, the exposure has still been too long. If, on the contrary, the time of exposure has been too short, the lights alone will be faintly marked in black, the picture will not be modified, but equal all over.

If it has been the proper length of time, a superb negative

is obtained, which will present the contrasts of light and shade very distinctly.

A first proof will serve to regulate the time of exposure in the camera in future.

37. It wonderfully accelerates the operation of developing, if the gallic acid is warmed. A very simple apparatus may be used: it consists of a water bath, which, by means of a spirit lamp, is kept at about 120 degrees of temperature; upon this rests the dish of gallic acid; an equal temperature is thus obtained.

The negative being fully developed to the satisfaction of the operator, it is removed into another bath of clean water.

38. If spots should form, produced by the oxide of silver, they may be removed by pouring over the negative some acetic acid, passing a brush lightly over it.

## FIFTH OPERATION.

### FIXING THE NEGATIVE.

39. Make in a bottle the following solution—

| | |
|---|---|
| Filtered water | 24 oz. |
| Hyposulphite of soda | 3 oz. |

Put this in a dish to the depth of two-tenths of an inch, plunge the negative completely in, paying great attention to remove all air-bubbles.

The hyposulphite of soda removes all the salts sensitive to light, but has no effect on the gallate of silver, forming the dark part of the picture.

Only one picture should be placed at the same time in this bath, though the solution may be used for many in succession.

The hyposulphite may be preserved in a bottle, the clear portion being filtered for use, and will be found perferable for weak proofs.

40. On examining the proofs sometime after they have been

in the bath of hyposulphite, the operator is tempted to think they are spoiled, because the iodide of silver, which has a pale yellow tint, being completely taken out in some places, and remaining in others, forms spots destroying to all appearance the image; but by waiting till all the iodide of silver is completely removed, which is seen by the yellow tints disappearing, the whiteness and transparency of the picture, as well as the beauty of the shadows, are fully developed.

41. If the negative remain too long in the hyposulphite, it will lessen the intensity of the blacks; too much attention cannot be paid to this operation.

42. The picture must now be washed in several waters, then left in a large basin of water for about half an hour, in order to remove all trace of the hyposulphite of soda; it is then dried between blotting paper.

43. The proof thus fixed is unalterable by light, since there only remains in the paper the gallate of silver.

I have some negatives thus prepared which have served me for taking from 200 to 300 positives, the last being as perfect as the first.

33. Fixing the negative by bromide of potassium. This method, though far inferior in point of permanence to hyposulphite of soda, nevertheless possesses some advantages, especially to the tourist; as by means of it he may fix his negatives temporarily, and avoid soiling his hands with the hyposulphite of soda, of which he cannot be too careful. A solution being made by dissolving $\frac{3}{4}$ ounce of bromide of potassium in 2 pints of water several pictures may be put in together. After being removed, they are to be washed in two or three waters, and dried by blotting paper. They are now sufficiently fixed for a time, and may be finally finished by the hyposulphite of soda on returning home, or at the artist's leisure.

45. Positives should not be printed from them, till after the final fixing.

## SIXTH OPERATION.

RENOVATING THE TRANSPARENCY OF THE WAXED NEGATIVE.

46. After the preceding operations the negative has frequently a streaky appearance.

To remove this, hold the negative to the fire, so as to re-melt the wax, which will restore its transparency. Another method is to hold the negative over some lighted sheets of blotting paper which have been already used for other purposes.

## SEVENTH OPERATION.

PREPARATION OF THE POSITIVE PAPER.

47. Make a solution of—

Hydrochlorate of ammonia, $\frac{1}{4}$ oz.
Distilled water, 5 oz.

Put two-tenths deep of this solution in a dish.

Make then another solution containing—

Nitrate of silver, $\frac{3}{4}$ oz.
Distilled water, 5 oz.

Put the same quantity of this into another dish.

The paper, which should be a little thicker than for the negative, is to be previously cut to a convenient size, observing which is the wrong side, and marking it with a cross; this is easily recognised, being the side which shows the impression of the metallic cloth used in its fabrication, the woof remaining imprinted upon it, and may be seen by viewing it by a bright light.

48. The best paper for this operation is that of Canson Freres.

Place the right side of the paper upon the first solution, not permitting the liquid to touch the other side; leave it there from two to four minutes, then take it out and dry it between several sheets of blotting paper, rubbing it with the hand.

Prepare three sheets of paper thus, taking care that every trace of humidity be removed.

Take the first sheet, and with a large brush rub the prepared side, for the purpose of cleansing it from all impurities.

Place it then upon the solution of nitrate of silver, taking care to wet only the salted side, and leave it whilst you cleanse another sheet.

49. By leaving the paper for a short time on the nitrate of silver, red tints are obtained; prolonging the operation, black tints are produced. The paper is then dried by suspending it by one corner. This operation should be performed in the dark, or by the light of a single candle.

Be careful that the positive paper be perfectly dry, before placing the negative upon it.

It is better to prepare this positive paper the evening before; but if used at the time of preparation, dry it well by the aid of a spirit-lamp, or before a fire.

If a great number of positive pictures are required, the operation can be accelerated by submitting the paper to the first bath, and leaving it to dry, as before described. This operation can be done at any time; the paper will keep an indefinite period, before receiving the bath of nitrate of silver.

In this case, only put 60 grains of hydrochlorate of ammonia to 3 oz. of water for the first bath. The second, containing the nitrate of silver, remains the same, and is prepared only a few hours before required for use.

### ALBUMENIZED POSITIVE PAPER.

50 One of the great advantages that photography receives from albumen is, without doubt, its use in the preparation of the positive paper, to which it gives a brilliancy and vigour which it is difficult otherwise to obtain.

Take the whites of several eggs and add to them 4 per cent. by weight of crystallized chloride of sodium, or, still better, of

hydrochlorate of ammonia: beat them to a froth, and decant the liquid, after leaving it a night to settle.

Pour this liquid into a basin, and prepare one side of the positive paper by the following method.—Take a sheet of paper, holding it by two of its corners; pass it over the edge of the dish, and along the surface of the liquid, taking care that none flows on the upper side, and that no air bubbles exist on the under. Leave it on the solution two or three minutes without touching it, and then remove it at once. Hang it up by one corner to dry. When dry, place it between two sheets of white paper, and pass a hot iron over it. The paper thus prepared has a highly varnished appearance. This can be modified by adding half the quantity of distilled water to the chloride of sodium, before beating up the eggs. This will be found an excellent mixture; it gives great finish and vigour, without having the appearance of a varnished picture, which is not artistique.

This albumenized paper can be preserved some time before being excited by the nitrate of silver.

The albumenized side of the paper is now to be placed in a bath of nitrate of silver, and left there for about four or five minutes. The proportions for the bath are, 15 parts of nitrate of silver to 100 parts of distilled water.

Take the paper out of the bath, dry it, suspending it by one corner, as before described.

This albumenized paper gives great intensity to the shadows, and brilliancy to the lights.

## EIGHTH OPERATION.

### PRINTING THE POSITIVE.

51. Take the negative and place it upon the glass of the copying frame face upwards; lay over it a sheet of prepared positive paper; the sensitive side of the paper being placed in contact with the right side of the negative; over them place the

second glass, if two be employed, and then the back of the frame, which is then pressed down by means of the tightening screws. A sheet of transparent waxed or gelatine paper may be placed beeween the negative proof and the positive paper. This will preserve the negative from any contact with the nitrate of silver, which might spoil it. A small piece of the positive paper may be allowed to project from the frame, for the purpose of judging. by the change of colour, of the progress of the picture without disturbing it.

Expose the frame to the sun, so that its rays may fall perpendicularly on the proof.

52. The various successive tints that the proof will take are as follows:—greyish blue, neutral tint, blue, violet, dark blue, bistre, coloured sepia, yellowish sepia, dead leaf yellow, grey—all diminishing gradually till the oxide of silver is reduced to its metallic state.

It is impossible to fix the precise time for the exposure to the light; it must be regulated according to the vigour of the negative, and the intensity of the positive required. For example:—To obtain a proof of a black tint, the dark parts should have a sepia tone, and the lights a greyish blue. The operator may, therefore, watch the progress of his picture by the projecting piece of paper, and remove it at the tint he requires.

## NINTH AND LAST OPERATION.

### FIXING THE POSITIVE.

53. The positive thus obtained is not permanent; it must be fixed promptly by the following operation:—

Make a solution of,

Hyposulphite of soda, 3 oz.
Filtered water, 18 oz.

Then dissolve 277 grains of nitrate of silver in a glass or two of water; when it is dissolved, add a solution of chloride of sodium, till the former loses its white appearance. Leave the whole to settle for a minute, then decant the liquid; a precipitate should remain of 231 grains of chloride of silver. Expose this precipitate, in a small capsule, to the sun, to blacken it, taking care to stir it about with a glass rod, so that all portions be affected, and expose it to the solar rays. When it is quite black, put it in the first mixture, namely, the hyposulphite of soda, and leave it to dissolve. By this preparation, the black tints are immediately obtained with the fresh hyposulphite.

The hyposulphite being better when it is old, should it become thick, add a fresh solution, leaving out the chloride of silver; the old containing an excess, which it has imbibed whilst remaining on the proofs.

Care should be taken to filter the solution, to collect the black deposit which forms. This last may be dissolved in fresh hyposulphite.

By leaving the picture in this bath, for a shorter or a longer period, all the tints may be obtained, from the red to the black, and even to the clear yellow. A little experience will soon enable the operator to obtain the required tint. To fix the proof properly, it should never be left less than an hour in this bath; and even three or four days will be necessary to obtain the sepia and yellow tones.

54. The operation may be accelerated by warming the hyposulphite. The picture however must never be left for an instant to itself, the rapidity of the action being very great. This method should only be employed when pressed for time, the results being generally not so good.

55. By adding to the preceding solution of hyposulphite $\frac{3}{4}$ ounce of ammonia, very pretty bistre tints are obtained, and very pure whites.

Good yellow tones may be produced by putting a strong

proof—first, into the bath of hyposulphite, well washing it, and then placing it in a bath, composed of 2 pints of water and $1\frac{1}{2}$ ounce of muriatic acid, washing it well afterwards in water.

Liquid ammonia employed in the same proportions, without previously putting the proof in the hyposulphite, will also produce excellent tones.

When the desired tones are produced, wash the picture in several waters, and leave it in a water bath for several days, so as to extract all the hyposulphite of silver. This can be ascertained by touching the picture with the tongue : if there be any remains of the hyposulphite, there will be a sweet taste.

The proof is then to he hung up by one corner, and afterwards dried between blotting paper. The whole operation is then finished.

56. Printing the positive requires all the attention of a skilful artist, and should not be regarded as a secondary matter.

It is necessary to observe with attention the shade of the picture with the subject, and the effect to be produced.

I should add, that if a first-rate picture is required, it is better to put it alone in the bath of hyposulphite of soda.

### PREPARATION OF IODIZED WAXED PAPER FOR PORTRAITS.

57. I prefer iodized waxed paper for taking portraits to any other, as it acts quicker and gives a greater finish.

The only modification that I make from the preceding process, is to partially dry the waxed paper between sheets of blotting paper, immediately after taking it out of the aceto-nitrate of silver (§ 16), and without washing it in distilled water (§ 17), and to place it while moist in the dark frame of the camera, using it as soon as possible. Should simple iodized paper not waxed be preferred, proceed as follows:—Pour the filtered solution of aceto-nitrate of silver into a porcelain dish, or on a flat glass plate ; taking the sheet of paper by two corners, place it on the nitrate of silver, raising and lowering it in

order to remove all air-bubbles; to avoid contact with the fingers, a pair of horn forceps will be found convenient. Care must be taken to prevent the solution of nitrate of silver coming in contact with the back of the paper, as that causes inequalities in the sensitiveness, and consequently spots. Leave the paper thus submitted to the action of the aceto-nitrate of silver, until the formation of the sensitive film is complete. For this purpose, and with paper prepared with the sugar of milk, about five minutes is sufficient, depending somewhat on the temperature, and also on the quality of the paper, the English papers taking rather longer than the French. With the waxed paper, the disappearance of the violet tint will be a sufficient indication.

58. Apply the paper thus prepared, and while wet, on a slate upon which has been previously placed a sheet of wet paper; the slate fitting into the dark frame of the camera. The back of the dark frame itself may be used in place of the slate, covering it with a slight coating of wax.

The paper may also be placed between two glass plates, taking the precaution to clean them well first, and to re-polish the outer surface before exposing them to the light; for this purpose, the Papier Joseph is by far the best material, being superior to linen.

I prefer, however, the slate, as it has the property of remaining moist a considerable time. The prepared side of the paper is, of course, the one to be exposed to the luminous rays.

Care should be taken to mark the bottom side of the slate so as always to place it in a similar position, in order to prevent the liquid collecting at the bottom, flowing over the surface of the paper. The paper may be left on the slate three or four hours, before being placed in the dark frame. Should it be required to take the prepared paper to a distance, the paper lining (§ 58) should be immersed in a solution of gum arabic in place of the water, as it preserves

the paper in a moist state longer. When the sheet of lining has well adhered to the slate, it is better not to remove it; when taking a fresh picture, it is sufficient to pour upon it a little water.

The remaining operations are the same as in the dry process.

THE END.

J. HADDON AND SON, PRINTERS, CASTLE STREET, FINSBURY.

# SUPPLEMENT.

THE following modification of Le Grey's process having been carried out with considerable success by Mr. James How, assistant in the philosophical establishment of the publishers, George Knight and Sons, Foster Lane, and being considered by them to possess many advantages over the original one, they have added it as a supplement to this translation.

The "Waxed Paper Process," * although not at present in general use, will, I doubt not, when brought to the state of perfection of which it is capable, be universally adopted for views, while the collodion will be the one selected for portraits.

I hold this opinion of the great value of the waxed paper process for the two following reasons :—First, it is obvious, that the thinner the paper used for negatives, the sharper the picture will be in the positive when printed from. In the Talbotype process very thin paper cannot be used, since it would be too weak to allow the many and frequent washings necessary; but this process of waxing imparts a horny character to the paper, making the thinnest very strong, without increasing its thickness; it may then be washed, soaked, and re-washed for several days if required, without the slightest fear of injury. And secondly, the paper so prepared can be kept after it is made sensitive and ready for the camera, without deterioration, from ten to fourteen days; while that prepared by the Talbotype process can only be kept for about as

* Extracted from a paper read by Mr. James How before the Chemical Discussion Society, May 11th, 1854.

many hours. This property in a climate so varying as ours, must be of infinite importance, when considered in point of convenience as well as of economy. One great objection which has been urged against the use of waxed paper up to the present time, has been the fact of its requiring so long an exposure in the camera. After repeated experiments, I have found that when treated in the way I am going to describe, this objection is entirely removed. Twenty minutes and even half an hour have generally been required for obtaining impressions, but I have lately succeeded with a 3-in. Voigtlander lens of 16-in. focus, in obtaining first rate negatives with perfectly black skies, which require no painting out, the whites quite clear, and the half tones also perfect, with five minutes' exposure in the camera. It therefore appears to me quite certain that no process will be able to obtain precedence of this, which holds out such claims to superiority, from the beauty and sharpness of its pictures, the very valuable non-deteriorating quality of the excited paper; considered in connexion with the fact of so short a time comparatively of exposure in the camera, being required to complete the impression.

The wax generally sold as white wax in small round cakes, should not be used, as it generally contains a large proportion of stearine and tallow, both of which are injurious in the preparation of the paper, but the proper wax, sold only in blocks, is really pure though not white, but a brownish yellow, it is well known in the drug trade. To wax the paper, I take an iron (I prefer a box iron) moderately hot, in the one hand, and pass it over the paper from side to side, following closely after it with a piece of the wax, held in the other hand, until the whole surface has been covered. By thus heating the paper, it readily imbibes the wax, and becomes rapidly saturated with it. The first sheet being finished, I place two more sheets of plain paper upon it, and repeat the operation upon the upper one (the intermediate piece serving to absorb any excess of wax that may remain), and so on, sheet after sheet, until the number required are saturated.

The sheets, which now form a compact mass, are separated by passing the iron, moderately heated, over them, then placed between folds of bibulous paper, and submitted to a further application of heat by the means just described, so as to remove all the superfluous wax from the surface, and render them perfectly transparent—most essential points to be attended to in order to obtain fine negative proofs.

I will now endeavour to describe the method of preparing the iodizing solution.

Instead of being at the trouble of boiling rice, preparing isinglass, adding sugar of milk, and the whites of eggs, &c., I simply take some milk quite fresh (say that milked the same day), and add to it, drop by drop, glacial acetic acid, in about the proportion of one, or one and a half drachm fluid measure to the quart, which will separate the caseïne, keeping the mixture well stirred with a glass rod all the time; I then boil it in a porcelain vessel, to throw down the remaining caseïne not previously coagulated, and also to drive off as much as possible of the superfluous acid it may contain. Of course any other acid would precipitate the caseïne; still I give the preference to the acetic from the fact that it does not affect the after process of rendering the paper sensitive, that acid entering into the composition of the sensitive solution.

After boiling for five or ten minutes, the liquid should be allowed to cool, and then be strained through a hair sieve or a piece of muslin, to collect the caseïne: when quite cold, the chemicals are to be added.

I would here observe, that some difficulty is frequently found in making this iodizing solution from the milk, in consequence of its not filtering perfectly clear, which I believe is owing to the difference of quality found in London milk; however, this may be obviated by adding to the strained liquid, (as soon as the caseïne is separated), the whites of two or three eggs to every quart; again boil, and on cooling, the liquid will be perfectly clear.

The proportions of chemicals I now use are as follows:—

385 grs. iodide potassium.
60 grs. bromide „
30 grs. cyanide „
20 grs. fluoride „
10 grs. chloride of sodium in crystals.
1½ grs. iodine.
2 oz. alcohol sp. gr. 836.

The above are dissolved in thirty-three fluid ounces of the strained liquid, and after filtration through white bibulous paper, should be perfectly clear, and of a bright lemon colour.

The iodizing solution is now ready for use, and must be preserved in well stoppered bottles, when it will keep for any length of time.

The waxed paper is laid, sheet by sheet, in the solution, in a flat porcelain or gutta percha dish, and allowed to remain there for the space of from half an hour to an hour, according to the thickness of the paper. Several sheets may be immersed at once —from twelve to eighteen; the whole should then be turned over, so that the first sheet immersed may be the first taken out and hung up to dry; thus far the process may be carried on by day-light. A small piece of bibulous paper, about one or two inches square, should be attached to the lower corner to facilitate the drying. The paper in this state may be kept for any length of time without injury, if preserved from the action of the air in a portfolio.

To excite the paper, or render it sensitive, take:—

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| Crystallized nitrate silver . . | 35 grs. | |
| Acetic acid* (glacial) . . . | 40 min. | |
| Alcohol, sp. gr. 836 . . . . | 1 dr. | |
| Distilled water . . . . . | 1 oz. | Mix. |

* It is of the greatest importance that the glacial acetic should be perfectly pure, otherwise the whites cannot be obtained perfect, and the whole result will be unsatisfactory; the cheap acid frequently sold under this name is quite unfit for the purpose, and is constantly the cause of disappointment.

As soon as dissolved, put this solution of aceto-nitrate of silver into a glass or porcelain dish (glass should be preferred), then take up one of the sheets of iodised paper by the two ends, and bend it into the shape of a horse-shoe, gently drop the centre on the surface of the solution, and gradually lower both ends. By this means all air-bubbles will be excluded; if any should, however, remain, they will be seen through the transparent paper, and may be easily expelled by passing the finger-nail, or any convenient instrument, over them, after having carefully raised up the corner of the paper nearest to the bubble.

The dish should now be gently tilted, to allow the greater portion of the liquid to run to one side, and by means of a pair of horn tongs, the edge of the paper nearest to the deep fluid should be pushed under it; by treating each edge in this way as quickly as possible, and having got all the edges under, then by gently shaking the whole, the entire surface will become immersed, and by constantly agitating the dish containing the solution and the paper, a very nice even coating may be obtained. This method is found far preferable to merely laying the sheet upon the surface, since it is made sensitive in much less time. The paper should be left in this dish for about five minutes, two minutes after the brown iodised colour appears by the light of a candle to have been turned white, though by day-light it would be found to be a very beautiful canary-yellow.

To economise the solution, the sheet may now be held up by one or two of the corners to drain into the dish for a few seconds, and then plunged into a dish (of dimensions corresponding to the size of the sheet) of distilled water; a second sheet may now be taken, and the process of immersion in the exciting liquid commenced with it; as soon as this is thoroughly covered with the solution, and has been agitated as before described, it may remain while the first sheet is being turned over and over in the water, it is then transferred to a second dish containing distilled water, in which it is again well washed and afterwards hung up to drain. It should then be placed on a clean white sheet of

bibulous paper of a corresponding size, to absorb the moisture, and another sheet of the same bibulous paper laid upon it; by this time the second sheet of excited paper will be ready for treatment in the distilled water in the same manner as the first. Thus any desired number of sheets may be excited.

They should now be placed between fresh pieces of clean white bibulous paper, and kept under pressure, to exclude light and air until required for use.

Paper prepared in this manner will keep perfectly good and equally sensitive for a very long time,* a desideratum, I think, of no small value to the tourist, who knows not how often, nor under what circumstances, an opportunity may occur to him for a sketch. The exciting part of the process must be performed only by the light of a candle, or in a room with a yellow blind drawn over the window, which, while travelling in the country, he should always be provided with, and which will also serve for a focusing cloth,—common yellow calico doubled answers perfectly well.

Some may consider the use of so much bibulous paper superfluous or even extravagant, but absolute cleanliness is essential to success, and it is far better to waste a dozen pieces of bibulous paper than run the risk of spoiling a single negative picture, to obtain which perhaps many times the cost of the paper has been expended in travelling, or otherwise.

To place the paper in the camera slide, the double paper-frames should be laid open on a table, the glasses in each having been well cleaned; upon one of the glasses a sheet of the sensitive paper is placed with its marked side downwards, or towards the glass, for the purpose of receiving the image; upon the back of this lay a clean piece of dry bibulous paper, previously cut to the size of the frame, then a piece of yellow paper or opaque mill-board, sufficiently thick to prevent the light passing through.

* I have kept this paper for a period of six weeks in this country, and then obtained good results; of course, in India, or other warm climates, it would not keep quite so long.

Now, lay a piece of bibulous paper upon this, and, lastly, a second sheet of the sensitive paper with its marked surface upwards. The whole of this operation must be performed in a dark room, or by the light of a candle. After the frame is closed it is ready for exposure in the camera. The time of exposure depending as it does on the focal length of the lens employed and the amount of light admitted through the diaphragm, must necessarily be left chiefly to the discretion of the operator—a hint or two, however, may not be unacceptable. The size of the diaphragm should vary with the magnitude and distance of the object to be taken. If the object be a single building, and at such a distance as to fill the field of view of the camera, when a 3-inch or No. 2 Voigtlander view lens is employed, and its largest opening of $\frac{7}{8}$-inch diameter be used, (which is sufficiently small), three to five minutes' exposure will be found sufficient. For more distant objects, it is advisable to use the smaller diaphragm or stop, which is about $\frac{1}{4}$-inch in diameter, and to increase the length of time of exposure, by two or three minutes. A few experiments will give a much better notion about the working time of different lenses than could possibly be imparted by many pages of written instructions, so much depending upon the colour of the glass employed in the manufacture of the lenses, which should be perfectly white. This may be ascertained by laying the lens upon a sheet of white paper, and judging from the difference of colour between the paper through the glass and that part not covered.

The picture is developed with gallic acid immediately after its removal from the camera; or, if more convenient, this portion of the process may be delayed for several days. I would here describe a method of preparing the solution of gallic acid, whereby it may be kept in a good state of preservation for several months. I have kept it myself for four months, and have found it, after the lapse of that period, infinitely superior to the newly made solution.

What is generally termed a saturated solution of gallic acid is,

I am led to believe, nothing of the kind. In all the works on photography, the directions given run generally as follow:—'Put an excess of gallic acid into distilled water, shake the mixture for about five minutes, allow it to deposit, and then pour off the supernatant fluid, which is found to be a saturated solution of the acid.'

Now I have found by constant experiment, that by keeping an excess of acid in water for several days, the strength of the solution is greatly increased, and its action as a developing agent materially improved. The method I have adopted is to put half an ounce of crystallised gallic acid into a stoppered quart bottle, and then to fill it up with water, so that, when the stopper is inserted, a little of the water is displaced, and consequently every particle of air excluded.

The solution thus prepared will keep for several months. When a portion of it is required, the bottle should be refilled with fresh distilled water, the same care being taken to exclude every portion of atmospheric air,—to the presence of which I am led to believe, is due the decomposition of the ordinary solution of gallic acid.

Of this saturated solution of gallic acid, put into a dish about sufficient to cover the sheet, lay the face of the undeveloped picture downwards in the solution, taking care that no air-bubbles are present, completely cover this sheet with the liquid, by agitating the dish, and lay another sheet requiring development with its back on this, or face upwards; again agitate the dish with its contents, so as to entirely cover the whole of the upper surface, and allow the sheets to remain until the pictures partially show themselves. Now pour the solution of gallic acid from the dish into a glass measure, or other convenient vessel, taking care that it is quite clean, and free from any hyposulphite of soda, and add some of the aceto-nitrate of silver (the solution left from exciting the paper) in the proportion of from 8 to 10 drops to the ounce, add also one or two drachms of alcohol; stir these with a glass rod and return them to the dish containing the nega-

tives for their complete development. They should now and then be turned over, that is, the picture which is now at the bottom should be at the top, and so changed two or three times. It is advisable to adopt this means of adding the aceto-nitrate of silver, for if poured directly into the dish in which the negatives are, before being mixed with the gallic acid solution, a black deposit would be formed upon that part of the dish where it was poured, the picture would also be probably spoiled by its having a marbled appearance in some parts. The solution may sometimes have a tendency to turn cloudy or black, in which case it should be changed for fresh, should the development not be completed; the negative should be allowed to remain in this solution, till, by holding it by the corners to the light of a candle, the sky appears perfectly black, when it should be taken out and rinsed in a little clean common water, to wash off the excess of acid. The picture is now fixed by plunging it into a solution of hyposulphite of soda in common water, in the proportion of 1 oz. of the former to 8 ozs. of the latter. It should be allowed to remain in this solution for from thirty minutes to one hour, or until the yellow parts appear perfectly white and transparent, but certainly not so long as to injure the blacks, which would be the consequence of leaving it too long.

Should some parts of the negative appear of a red colour instead of white, and this is sometimes the case from over exposure in the camera, they may be recovered by immersing the whole in a weak solution of cyanide of potassium of 5 or 6 grains to the ounce of water; by over immersion in this solution the blacks are liable to injury, in which case it is necessary that they be replaced with Indian ink or lamp-black, and prepared ox-gall sold for the purpose (the ox-gall serves only as a vehicle for the ink or lamp-black and will cause either of the above substances readily to adhere to the waxed paper.)

After the fixing is satisfactorily performed, each negative should be allowed to soak for several hours in common water, which should be changed several times, in order thoroughly to

dissolve out the hyposulphite of soda; unless this be done the picture will eventually be entirely destroyed by the action of this salt.

When sufficiently soaked the negative should be attached by means of a pin by one of its corners to a shelf or other convenient place; its drying being facilitated by attaching a small strip of bibulous paper to its other extremity.

When perfectly dry, the negative should be held before the fire to remelt the wax it contains, or (which is preferable) placed between two sheets of blotting-paper, and a hot iron passed over it, to diffuse and equalise the wax.

The negative now finished is ready for printing from; a process to which I hope to draw your attention on a future occasion.

HADDON, BROTHERS, AND CO, PRINTERS, CASTLE STREET, FINSBURY.